The values are smoothed up to 1900, but not in later years.

I have placed an asterisk in the table and diagram to those years in which a conjunction occurred between the red spot and the south tropical spot. In every case it will be seen that the red spot moved at a more rapid rate in those years when conjunctions were observed.

The south tropical spot or disturbance is a totally different object both in form and nature, and probably in origin, from the great red spot. The latter has preserved its symmetrical oval form since it was observed by Dawes in 1857, but the former has varied enormously in its length and detail. In 1901 it was scarcely more than 20° long, in 1902 July 87°, in 1903 48°, in 1905 44° to 60°, in 1911 115°, in 1912 65°, in 1913 March 140°, and in 1918 180°, so that in the last-mentioned year it extended half-way round the vast diameter of Jupiter.

This marking exhibited undue faintness in 1918 and the early part of 1919, and it appeared to be on the eve of disappearing, like the hollow in the great south equatorial belt where the red spot lies. However, there has recently been some intensification in the material forming the south tropical spot, so that observations are being made to trace its position and developments. It is satisfactory also to know that the red spot itself continues to retain its definite form, and is sufficiently distinct to be within easy recognition when a steady air conduces to good seeing. This spot seemed to be breaking up or wearing out early in 1919, but it has recovered something of its old-time aspect, and is well within reach of the telescopes usually in the hands of amateurs.

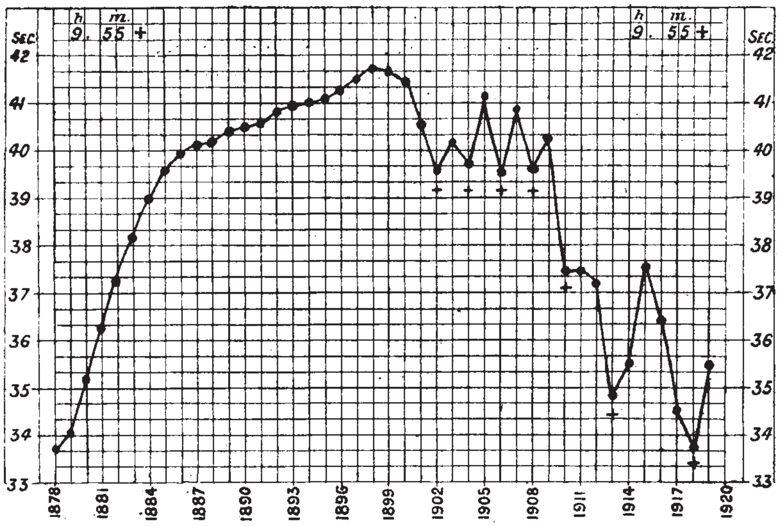

FIG. 1—Rates of rotation of the Great Red Spot on Jupiter.

Since Schwabe first saw the hollow on the south side of the great south equatorial belt of Jupiter in 1831 September 5, the planet has rotated more than 78,000 times. There is every reason to conclude that the object he saw is the same as that which has been so prominently visible in recent years in close contiguity to the red spot. The two features appear to have participated in one and the same fluctuating rate of rotation, a mean of which was 9h. 55m. 36·8s. during the 88½ years included in the observations.

The observations upon which my deductions for recent years are based were made by the Rev. T. E. R. Phillips and Mr. F. Sargent, and I take this opportunity of acknowledging their kindness in furnishing the necessary materials. My abstention from planetary work has been practically enforced, but, amid the regret caused thereby, I feel great satisfaction in the fact that others are pursuing it with much ability and energy.

W. F. DENNING.

Bristol, May 11.

British and Foreign Scientific Apparatus.

Now that we are living in an age of "trusts" there is no need to fear foreign competition in respect to prices. The only points our home manufacturers should lay stress upon are quality and quantity, and should these be maintained at a high level they can hold their ground against foreign manufacturers; that is, so long as the manufacturers throughout the world have confidence in their respective associations. Whenever these commercial associations begin to fall asunder we may expect competition in prices to operate, and then it will mean a commercial war, not between nations, but between individual manufacturers in Europe and America. The result will mean financial benefit to the users of scientific apparatus, just as the recent slump in prices of the necessaries of life may soon prove to be advantageous to consumers generally throughout the world.

Scientific apparatus is as necessary to the maintenance of healthy life as are hygenic clothing and wholesome food; and if protection for British manufacturers is required in the form of prohibition except under licence to induce them to improve the quality and the output, with the ultimate object of developing an optical industry within the Empire of such importance that there would be less danger to the State in the event of another war, why should the users of scientific apparatus be expected to bear the hardships in regard to poorer quality and higher prices even for a temporary period? Surely it is a question for the Government to decide as to what amount of State aid is required to develop a key industry that the whole nation may be called upon to bear the expense instead of an extremely small minority of the population.

In pre-war days our principal foreign competitor was Germany, not so much in price as in quality, and if German manufacturers were able to develop an industry of very considerable importance without State aid, why cannot British manufacturers do likewise?

There was one person in Germany who was more responsible than all other makers together in lowering prices, viz. Leitz of Wetzlar. He always appeared satisfied with a comparatively small profit, and aimed at a very large output; and, I believe, he was the first to sell 1/12-in. oil immersion objectives at 5*l.*, and curiously this ultimately became a uniform price throughout the trade in Europe and America. The same maker sold students' microscope stands at 55*s.*, which, with suitable optical equipment, was a serviceable instrument with highest magnifications. The prices of these articles to-day are 9*l.* and 8*l.* 5*s.*—higher than the British equivalents.

Since the armistice German manufacturers have

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been obliged to adjust their prices in accordance with the rate of exchange for each country to which they export, and for our country their prices are at present 100 per cent. on average above pre-war English prices. The wages in the German optical industry have increased more than 400 per cent., and are likely to rise still higher. Opticians and mechanics earning the equivalent of 1*s*. per hour before the war now receive 5*s*. 6*d*. and have a working week of forty-eight hours. They are living in a state of semi-starvation, passing through an experience at present much worse than anything we endured in the war, and unless foodstuffs are sent from England and America the Germans may be forced to conditions similar to those experienced by them during the last two years of war, until the next harvest provides better supplies. The low value of German money makes it exceedingly difficult for manufacturers to import raw materials. Many iron and steel works are closed for want of coal, and most of the coal delivered from the mines is what our miners call "dust." The French take the coal and leave the rubbish, "which is good enough for the Germans." Motor lorries are standing idle for want of petrol or benzol; and, for transport, horses are employed instead. Manufacturers do not pay a percentage on excess profits, but have to deliver up the whole of these profits to the State.

I fully appreciate the question which Mr. Baker raises in his letter appearing in NATURE of May 20: "The rate of exchange makes the prices seem low as compared with those in this country, but can Prof. Bayliss obtain delivery at the low prices?" Having spent six weeks recently in the German interior and purchased a considerable quantity of optical apparatus, I found it impossible to get the goods exported to England at the rate of exchange, but had to pay English prices in English money; also it was necessary to obtain licences from the German Government before goods could be exported.

The foregoing statements indicate briefly some of the conditions prevailing in the scientific apparatus trade in Germany, and there is evidence of their having to continue for a very considerable period.

I believe our manufacturers have had the opportunity of a lifetime since the armistice, and there is still time to reorganise British workshops to compete successfully with foreigners without State aid, but with courage, capital, and enterprise.

The proposed Anti-dumping Bill is a misnomer. There is no dumping done in scientific apparatus in our country, and never has been any. We could produce quality equal to or better than that of any other nation if we set ourselves to the task. One example during the war—the best aerial photographic lenses were made by an English firm. Germany came second. The tests were made by disinterested officials in the Royal Air Force. J. W. OGILVY.

Hill View, Westerham Hill, Kent, May 25.

THE letters from manufacturers on the subject of the supply of scientific instruments are interesting and fairly unanimous, but appear to me to miss the whole point of the situation. That is, that after five years' freedom from competition our manufacturers cannot in many classes of scientific instruments compete successfully with German firms.

If the rate of exchange is the cause of the importation of German instruments, what is the cause of hundreds of American microscopes and lenses being sold during and after the war with the rate of exchange adverse to us? The Germans are selling their goods in England at *current English rates* and above, yet find a ready sale. At first, it is true, some individuals smuggled in German instruments at mark rates, but as soon as the extent of the demand was realised, German firms put up their export rates to 60–100 per cent. above pre-war rates, to be paid *in English money*, and by some firms payment in advance is insisted upon. This is more than confirmed by Messrs. Bellingham and Stanley in their letter. What more do our manufacturers want?

The German goods are sold simply because they are superior to similar goods produced at reasonable prices in Britain. Mr. B. H. Morphy and Mr. C. Baker state that this was the case before the war, and most scientific workers will tell them that it is so still.

One firm complains of a voluntary hospital buying apparatus cheaper abroad, and thinks that an English firm should have been given the contract at higher rates. Whose money is to do this? I hope that the voluntary subscribers would protest against their money being paid to subsidise British manufacturers.

A small concrete example of what actually occurs may not be out of place. A German diamond object marker before the war cost 10 marks. Early this year I sent to a leading firm of British opticians for one. It arrived, but was absolutely useless, having no spring safety device and no means of screw adjustment, both present in the German one. It cost 1*l*. 10*s*. Months later, with considerable trouble, I procured from Messrs. Leitz, of Germany, the pre-war article at 100 per cent. advance, namely, 1*l*. The German article was bought because it was superior, not because it was cheaper.

It should be borne in mind that some scientific articles, *e.g*. photographic plates, can be produced well and cheaply here, and need not fear German competition. If, as Mr. Baker states, the profit on other classes of goods is too small, why not allow them to be imported from Germany?

Glasgow, May 21. J. S. DUNKERLY.

Cost of Scientific Publications.

LIKE other societies which exist mainly for the publication of the results of scientific research, the Royal Society of Edinburgh finds its activities greatly hampered by the present cost of publication. The statements contained in the leader in NATURE of May 6 and in the correspondence which has followed it are fully borne out by the experience of this society. Taking into account all present sources of income and all necessary expenses, it may safely be said that the output of scientific literature must be cut down to fully one-third of what it was in pre-war days.

The point to be emphasised is that publication of scientific results is absolutely necessary for the true development of science. A year and a half ago the council of the Royal Society of Edinburgh, on realising the seriousness of the situation, appealed to the Chancellor of the Exchequer for an increase in the annual grant solely in the interest of scientific publication. The appeal was unsuccessful, but in reply the Chancellor of the Exchequer stated that "he would be ready to reconsider the question along with other similar claims when the financial situation is more favourable."

It certainly seems necessary that suffering societies which publish original memoirs should take steps to press on the attention of the nation and on the conscience of the Government this consideration in the interest of scientific investigation, viz. the provision of adequate funds for the publication of the results of research. C. G. KNOTT,
General Secretary.

Royal Society of Edinburgh,
22 George Street, May 31.

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